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The Manufacturing Confectioner

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POLICY

THE MANUFACTURING CONFECTIONER, being a specialized publication for manufacturing confectioners exclusively, is edited in the interest of the executives in charge of the purchasing, production and sales departments, and provides a medium for the free and frank discussion of manufacturing policies, problems, methods and materials.

The same corresponding policy applies to the advertising pages which are available only to the supply manufacturers for the advertising of products which are used by the manufacturing confectioner—machinery, raw materials and factory supplies, etc.

The Manufacturing Confectioner believes in

A Technical Confectionery Institute, with model manufacturing units, resident and extension courses for practical candy men and equipped also for research and analytical laboratory service.

Rigid Inspection of candy factories to enforce sanitation and working conditions necessary for the production of a pure food product.

Pure Food Legislation which enforces a quality standard for confectionery.

Uniform Method of cost finding and accounting.

An Annual Exposition of Confectioners' Supplies and equipment under direction of an association of confectionery supply manufacturers.

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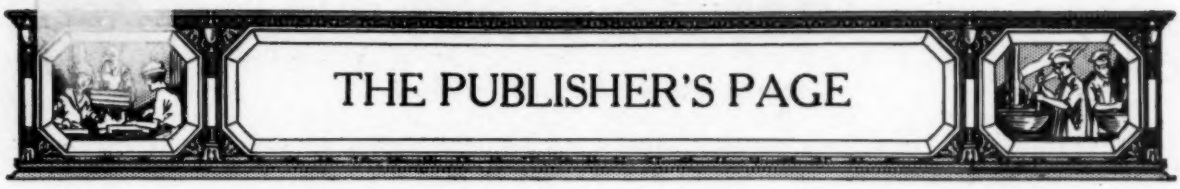


Cost Control

Some candy manufacturers are unwittingly selling certain of their products at a loss because they do not know their actual costs. Not infrequently their actual costs are in excess of their estimated costs. This may be due to ignorance, failure to figure in everything in making estimates, or to lack of an adequate system for cost control. In any event the result is the same. They sell goods at a loss, injuring not only themselves, but every other manufacturer of similar products.

The worst offenders are the small firms who do not know their costs and have the mistaken idea that because they are small their expenses must be less than those of the large firms. They fail to realize that the greater volume and wider distribution of the large manufacturer results in a lower cost per piece and pound. Other offenders are new firms just breaking into the business, particularly those promoted by men of limited experience who have no conception of the tremendous amount of overhead expenses necessary to develop and operate a successful confectionery plant. They leave out of their figures such cost items as interest on borrowed money, depreciation, obsolescence, repairs, bad accounts, storage of finished stock, air conditioning, spoiled batches, slow-selling lines, "duds," shrinkage of raw material and similar factors which no rule of thumb method of figuring costs takes into consideration. In fact, only a thorough, accurate and comprehensive system based on actual cost would succeed in picking up all items of expense incurred during the course of a year's business and distribute them properly so that each class of candy manufactured would be charged with its due proportion.

Firms who do not know their costs are a destructive factor in the industry and obviously there is need of a campaign of education to bring about better cost accounting methods. Undoubtedly much good could be accomplished by the use of more uniform methods and a freer exchange of cost data. The greatest obstacle to the success of such a plan is the habit and tradition of secrecy which permeates the entire confectionery industry. Some firms seem to think that they alone possess the only existing key to success and prosperity, and that their methods are so superior to those of other manufacturers that everything connected with their business must be kept absolutely secret. Nearly every other industry has recovered from this childish form of superstitution, and firms have found that instead of being ahead of the procession they were behind it. There is great need for some leader to arise in this industry and lead the way to a freer exchange of ideas, particularly on costs and cost accounting methods.

The High Cost of Cheap Equipment

Many a practical and able production man loyal to his post and with "work" as his middle name has failed to make good in the estimation of his employers under conditions that clearly show that the man was licked before he started. It may have been the factory or floor layout, or very likely the condition of the machines and equipment, or both, which precluded any possibility of producing the expected volume of goods at a profit, and yet the new man was hired to accomplish the impossible.

A number of instances of this kind have been observed by THE MANUFACTURING CONFECTIONER the past year or two; many of them find their origin of grief in the purchase of used machinery "guaranteed to be used only a few months and in perfect condition," but actually worn out.

In these cases the age of the machine was not discovered until the equipment failed to work and the original manufacturer of the machine was called in to defend his good name and product, at which time the latter's records showed the serial number and date of the first sale of the machine. These records of the confectionery machinery manufacturers are always open to the industry, to buyer and seller alike, and should be consulted whenever a sale of used machinery is considered.

When a piece of good, serviceable used equipment can be bought at a bargain there is no reason why a manufacturer should not take advantage of it but, the point is, be sure the values are there and don't expect your manufacturing department to be miracle men and get production from equipment that has had its day and if the truth were known, laid off because of old age in some competitor's plant before it was offered for sale. And furthermore, when a piece of equipment is worn out in your own plant have the fairness to scrap it or trade it in to the original manufacturer, who in most instances is the one most able to rebuild it in satisfactory shape. The high cost of cheap (?) used machinery is one of the uneconomic factors in the candy industry. A better understanding of equipment values and a closer relationship with the original manufacturer in each case will help to eliminate these losses.

An Informal Talk About Men and Machines

By A Candy Superintendent

A MAN who knows *how* is invaluable if he really knows *how* but if he knows *how* and *why* both, he is indispensable. That is not what we are going to talk about, but it is good stuff just the same. The writer was told the same thing some time ago and it has proved true. We all know what we superintendents are called on to do and know. *Everything no one else knows how to do or doesn't want to do.*

Are we mechanical engineers? *No!*

Are we called on to do mechanical engineering? *Yes!* Chemists? No! Bacteriologists? No! So it goes. A factory is like a small city; but the superintendent is not only the mayor. He is asked to be the whole Bureau of Standards, the Chemist, the City Engineer, the Board of Health, Chief of the Police and Fire Departments, and often the Pay Master and Commissioner of Accounts as well.

Some of the big people in the field recognize the value of organizing ability as superior to all these but they are few. In a really big house it is necessary only that the superintendent know good candy from bad candy and have that innate ability to pick men and place them advantageously, with which some men are blessed.

The smaller factories, and they do not need to be so small at that, cannot afford to hire a man of this type, but must have one who can organize, teach and administer. This is the man who must know *how* and *why*.

Much has been written on the conservation of man power. Too much cannot be written on that subject for at the bottom of everything lies the human equation and it cannot be ignored no matter how complete and perfect the system and organization of the plant may be. This subject links up closely with the mechanical department. For instance, nothing is more destructive to the even, harmonious operation of the factory and functioning of the employes than balky undependable machines.

Few of the machines with which a practical candy man is expected to "make good" are anything to brag about from the standpoint of mechanical perfection. These facts make the need of constant and skillful care more than ever imperative.

"Give your *men* the same care and attention you give your machines!" says the Welfare Worker. It is to laugh! Treated with the same care the machines get in most candy factories the worker would die of most anything from plain malnutrition to Bubonic plague. Mere scurvy from lack of oil and washing would be incidental.

The author of this article maintains the reverse attitude: "Treat the machinery with one-half the care you do the men and you will hardly know the place."

If a starch hand has a sore finger or arm and drops a pile of boards there is undoubtedly a strong temptation to hit him on the head with a hammer but all of us know that wouldn't help. He might do better for a few minutes but the old sore finger would soon get in its dirty work again and another pile would go. The same holds with the mogul. If the feed doesn't work there are better ways of permanently adjusting it than with a hammer.

Let us suggest a program. Be sure your machines are driven in accordance with the maker's instructions and fed with the power he advises. He may be wrong but there is a strong probability that he knew what he was talking about.

Have a master mechanic. A master mechanic in all the title suggests and hold him responsible for the operation of every machine. Have him instruct the man in charge of each machine how he is to oil it and make any changes of adjustments which are necessary in the course of its daily operation. Every time there is a shut down of the works have some of the machines which are in most constant use completely overhauled.

It is always well to remember that if a man was a competent mechanic he would not work in a candy factory as a laborer, so no matter how certain he may be of his ability to overhaul and repair a machine he cannot take the place of a man trained to the work.

It is about to be 1924 as this is written and the writer now engaged the writer's New Year resolution is to double the care given his machines. This is saying a great deal, for this lesson has been well and carefully learned. It is visibly apparent that an automatic wrapping machine must be kept perfectly clean. There is seldom a point of low efficiency on any of them. They work or they don't and that ends it, but a mogul or an enrober or a ball machine or drop head slows up and turns out poor work long before they quit outright. A good master mechanic with proper authority would see that these were kept clean and in adjustment all the time. The drop rollers are constantly wearing but if this is known and watched the boxes can be taken up, the gears shifted and the impressions soldered and dressed before any unsightly, poorly registered goods come through.

All machines which require precision in their operation and all cutting machines should be

(Continued on page 42)

Rules for Material Regulation

Henry H. Farquhar, of Harvard University, in his excellent book on Factory Storeskeeping, published by McGraw-Hill Book Company, gives the following "Rules for Material Regulation"

1. Replenishment of material must be governed strictly by requirements for production during a reasonable future period.
2. There must be predetermined specifications for each article purchased.
3. All replenishment orders must be in writing and may be issued only by specified persons.
4. All replenishment orders must be approved before they may be honored by the purchasing agent.
5. All purchase orders shall be in writing and must be systematically followed up.
6. All persons concerned directly in the transaction must receive copy of the purchase order.
7. There must be a careful count and inspection of all goods received before they may be stored or released for use.
8. Notice of receipt of materials must be given immediately.
9. Responsibility for storage and issue must be centralized.
10. Storage other than in the store room must be reduced to a minimum.
11. The store room must be accessible only to authorized persons.
12. Materials must be stored and indexed according to a systematic scheme.
13. Movable, interchangeable storage units must be used as far as possible.
14. Double-binning must be used whenever possible.
15. A perpetual inventory must be maintained on all goods.
16. Balances of materials must be kept on bin tags and on balance sheets with constant independent checks between them.
17. No materials must be issued except for authorized purposes upon written requests signed by specified persons.
18. All materials—raw, worked and factory supplies—should be carefully classified and preferably mnemonically symbolized.
19. Organization for material control must be carefully formulated and made effective by intelligent and persistent supervision.

Ed. Note: Reprinted by permission from Farquhar's *Factory Storeskeeping*, McGraw-Hill Book Company, New York City. (1922) A book well worth reading.

Uninsurable Losses in Raw Materials

(Shrinkage, Absorption and Soakage)

V. Customs of the Raw Material Trades and Their Relation to the Candy Industry.

A Series of Articles on the Customs of the Raw Material Trades and Their Relation to the Candy Industry.

By Albert Adams Lund

THEORETICALLY, all raw materials start their journey to you weighing 100 per cent of the weight at which they were packed and billed. Few of these materials ever reach their destination without a perceptible diminishment from the original shipping weight. Continuously, as well as every time the goods are handled, a small portion of the total quantity drops out of the reckoning. Severally, these losses may be insignificant; but in the aggregate, they seriously affect the cost.

We cannot assume that it is only the importer who suffers, for that portion of the loss with which he gambles, has in nominal measure already been accounted for in the quoted price under the guise "expenses of importation"; regarding the remaining portion there can be no doubt who pays for that. The files of the industry are full of claims against shippers and transportation companies, for the most part uncollectible—sums which should long since have been charged off to the cost of materials used.

A bit of rough handling here, an adverse or unguarded condition there, and the gamut of leakage, sifting and pilferage has begun. Add to these the continuous elements of natural shrinkage, container-soakage, and moisture-absorption (a factor which the dealer may take advantage of by deferring the invoice-weighing until just before delivery) and you have a graphic picture of fleeting profits and exaggerated overhead in any business which involves the handling of food materials.

A New York supply house (one of the Big Five) says that their "uninsurable losses" for the twelve months ending May 1st amounted to approximately one per cent of the cost of all the material they imported. "These were losses which we could not foresee or allow for in our expenses. This is the risk the importer takes. If the losses are serious we try to collect from the steamship companies but we seldom receive any reimbursement. Another firm says that on three steamers which arrived recently, each bringing them goods valued at about $100,000, their total loss through pilferage alone amounted to $1,500.

DO YOU KNOW:

—How much water you have in your stocks?

—The ratio between moisture-content and price on corn syrup, starches, etc.?

—What proportion of your raw material the "Forty Thieves" made away with last year?

—How to reduce shrinkage, soakage and absorption losses?

Mr. Lund throws new light on these and other phases of your "uninsurable losses" in his accompanying article.

No doubt you have wondered, if you were at all familiar with the practice, why the United States Government holds up the unloading of raw sugars while it is raining. The reason is that the moisture which the bags absorb decreases the polarization of the sugar and diminishes the amount of duty to be levied. The average variation, we are told, is in the neighborhood of .3 per cent.

A trip to the docks or public storehouses is a revelation to one unacquainted with this phase of raw material loss—remnants of all kinds of precious material trampled under foot

—torn bags and broken containers emptying out their contents hour after hour without a single attempt at preservation or salvages. In one large warehouse in New York City there may be seen any day of the week, at least fifty dollars' worth of miscellaneous nutmeats in the corners and crevices and along the aisles of each floor—floors whose long corridors are swept clear at the close of every working day. In a month's time this loss in a single warehouse amounts to thousands of dollars—some of it yours and some of it the other fellow's.

The share of these losses which we must bear in our individual businesses may not appeal to the imagination as vividly as those running up into four and five figures, but their effect is nevertheless real and as a matter of fact, proportionately g r e a t e r than those of the importer whose losses today are the basis of a higher import expense charge tomorrow, and whose ability to avoid such losses as shrinkage and soakage has already been commented upon in previous articles.

Lest e x c e p t i o n be taken to the inclusion of some of these items as uninsurable losses, it must be explained that a loss like pilferage, for instance, may be insured against. But in the highly competitive markets which prevail on the majority of our raw materials, the impossibility of doing business after the absorption of the usual rate for pilferage protection is sufficient to demonstrate the "uninsurable" character of this and similar losses.

In order that we may determine how these losses may best be minimized or accounted for in our costs, let us examine the purely physical aspects of these vital statistics of our business.

Do you know what proportion of your raw material "The Forty Thieves" made away with last year?

Shrinkage and Absorption Losses

THE one and two per cent tolerances allowed the seller by custom on shelled and unshelled nutmeats respectively offer strong if not conclusive evidence of the potent effect of natural shrinkage on the quantity cost of raw materials (by shrinkage is meant the loss in weight which is due to evaporation). The oft-used argument that the loss in weight is compensated for by the increased dryness or thoroughness of curing is "a delusion and a snare." With the exception of Japanese gelatine, whose loss through evaporation is counter-balanced by an increased absorptive power in the gelatine, there is scarcely a material whose least shrinkage from the packer's weight is not either directly or indirectly added to the buyer's cost.

The obvious relationship between the loss of weight and gain of weight requires the latter's introduction at this point. It is one of the paradoxes of applied physics that although the acquisition of weight through absorption is the reverse of the shrinkage or "down-weight" process, both factors are disadvantageous to the buyer from a purely economical standpoint. In the first place, materials subject to serious shrinkage losses are customarily s o l d on p a c k e r ' s w e i g h t s, whereas on materials possessing high absorptive properties the supplier or shipper is prone to take advantage of the last drop of moisture the atmosphere will give up, and even accelerate the process if he is not scrupulous. Furthermore, all t h a t is given off may not be moisture (for instance, the volatile character of the valuable constituents of essential oils, extracts, vanillin, etc.), whereas a material can gain nothing through absorption except moisture, which only serves to dilute the product while adding nothing to the value.

Peanuts, Pecans and Brazils

But since shrinkage and absorption are so largely a matter of moisture content, it would be well for those of you who have chemical laboratories to establish the normal moisture content and rate of shrinkage of the various materials you buy. The intimate relationship which exists between moisture content and cost is illustrated by the following examples from widely separated sources:

> **In June, 1919, the Southern Peanut Crushers Association adopted the following rule in connection with the grading of peanuts: "Sec. 7. Deduction at the rate of delivered price shall be made ..... for moisture in excess of 7 per cent."**

Observe also the standard differentials on moulding starch:

Goods containing 5% moisture, priced at .25 cwt. over basis.

Goods containing 7½% moisture, priced at .15 cwt. over basis.

Goods containing 10-11½% moisture, priced at bas's.

The ease with which one or two per cent of excess moisture may escape detection encourages under-curing and various other expedients to enable the shipper to beat legitimate competition and "get in" with lower prices. Whether through accident or design, variations in moisture content which throw off the purchase price as much as a cent or two a pound are being foisted upon unsuspecting buyers day after day on items like pecans and brazils. One can purchase pecans which will shrink in dry storage up to 5%, while on thoroughly-cured meats the amount of shrinkage may be so small as to be practically negligible. The same holds true in an even larger way with brazils, where an average shrinkage is difficult to define.

Some of the biggest dealers today will recall the time when it was common practice to spray brazils in the shell before shipment West to make up for some of the weight lost while on their hands. The nuts were put in bins, turned over and sprayed several times. The gain in weight usually amounted to about 4 or 5%. It is true that the goods often lost a substantial portion of this during transit, but the goods were sold on certified N. Y. re-weights, consequently the buyer stood the loss. The discontinuance of the practice was largely due to trouble with mould rather than any uneasiness at the fraud they were committing.

A current abuse is the storage of nuts in so-called "dry" (?) cold storage—where bags of walnuts, for instance, go in 101/102 pounds and emerge later weighing 104/105.

Whatever the laudable purpose of washing fruits like raisins and currants, we cannot explain in *our* costs the difference between fruit that is sticky or wet and fruit that is properly dry by repeating what a salesman said recently: "I'm sorry, sir, but we could not wipe off each raisin with a towel." The washing or recleaning of a product does not prevent its being restored to the correct degree of dryness. A discussion of the tests which may be employed for determining the proper degree of curing for various fruits and nutmeats will be reserved for a later article entitled "Practical Desk Tests for Raw Materials."

Factors Affecting Shrinkage

In order to determine how shrinkage losses may best be reduced, it is necessary to outline briefly the factors which influence or hasten the process. The rapidity with which a material will dry out is governed by

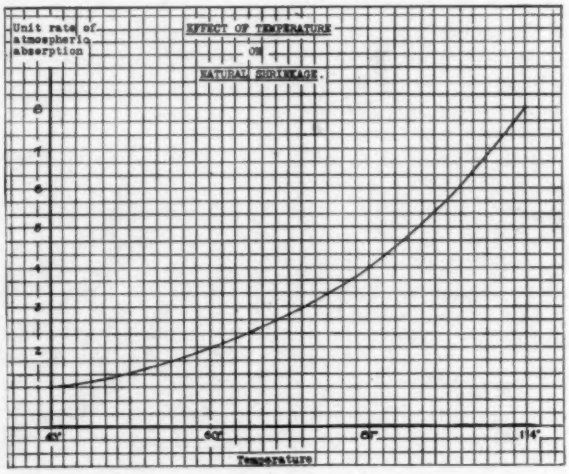
(1) The extent of its exposure to the air;
(2) The humidity of the surrounding atmosphere;
(3) The temperature;
(4) The rate of motion of the air which passes over the material;
(5) The length of time the material is exposed.

Wherever practicable, the following means may be employed to combat these conditions:

Exposure. Since in its nature evaporation requires the free circulation of air to carry off the volatile matter, it is important to keep all materials, especially liquids, tightly covered when not in use.

Humidity. While the prevention of deterioration requires a relatively low humidity, the fallacy of putting the material in too dry a storage is apparent where avoidance of shrinkage is an important consideration.

Temperature. The rate of shrinkage depends upon the amount of moisture required to bring the atmosphere to a state of saturation; therefore, since the capacity of the atmosphere to absorb moisture is practically doubled with every 27-degree increase in temperature (see illustration), it is important to store the material at as low a temperature as may be consistent with the character of the product.



The Effect of Temperature on Natural Shrinkage.

Rate of air-motion. When the atmosphere which surrounds the material has become saturated, the shrinkage process is retarded until the moisture-laden air is replaced with fresh, dry air. In commercial drying rooms, use is made of this principle to accelerate the drying or curing process. Consequently, although free ventilation may be desirable from the storage standpoint, it is well to avoid strong drafts and exposure to the direct breeze of fans, particularly on materials ordinarily susceptible to large shrinkages.

Duration of exposure. It is a self-evident fact that the longer the material is subjected to the conditions mentioned, the greater will be the loss through shrinkage. The supplier usually includes this shrinkage in his carrying charge and where you carry your own goods in storage for any considerable length of time you would do well to take this element into account.

Absorption of Starch, Acids, Etc.

A word further about absorption. The absorptive power of solids is much greater than that of liquids, since it is purely a surface phenomenon. In liquids, the air attacks the ex-

posed surface only, whereas on a solid like starch it pervades the entire body and the moisture is taken in through every pore. This explains why three samples of the same starch, a special moulding variety, when put up in different types of package, showed on opening at delivery as follows:

Sample in tin.....2.5% moisture
Sample in paper-lined bag.....8.3% moisture
Sample in ordinary cloth bag.....9.0% moisture

Under a condition of 100% humidity (which is not unlikely to prevail during a rainy spell, nor is a 95% humidity unusual during warm weather under general storage conditions), starch will absorb up to 25% of moisture. It is a fact well known to the manufacturers of this product that a 5% starch, for which the customer pays a premium of 25 cents cwt., will be 7½-8% before it is delivered. With the enormous possibilities for loss of this and other materials with high absorptive propensities, is it not pertinent to ask ourselves, "How much water are we paying for in the products that are delivered to us?"

The specific properties of losing or gaining weight are excellently illustrated by the widely-used acids, citric and tartaric. Under normal temperatures the former loses its water of crystallization and shrinks in weight, while the latter takes on moisture and becomes lumpy.

Above all things, be careful to specify "properly dry," "thoroughly cured," or the maximum percentage of moisture allowable, thus establishing your right to both the proper weight and the proper quality for the material which it is your intention to buy.

Soakage

It has perhaps never occurred to the majority of buyers that fortunes have been made through salvaging so apparently inconsequential an item as soakage. Yet if we were to measure our own losses through this agency over a year's time we would find that it ran into hundreds and even thousands of dollars, depending upon the quantity of materials used.

Before the advent of prohibition an enterprising resident of Newark amassed a considerable fortune, to say nothing of one of the finest estates in Short Hills, by buying up old whisky barrels and steaming them to get out the alcohol which had soaked into the wood. He used this alcohol in the manufacture of a cheap grade of whisky. His business grew until at one time he had a barrel contract with practically every saloonkeeper in Newark, to whom, in view of his long profits and cheap source of raw material, he was in a position to allow a higher rate than any of the local cooperage companies. The Federal revenue agents got after him, but were powerless to exact a tax from him, since he was able to prove that every gallon of alcohol that came out of the wood had already been tax-paid. Have you ever stopped to figure how much alcohol and natural vanillin you lose on a barrel of vanilla extract?

Although the object of the sugar refiners in washing their empty raw sugar bags is primarily to salvage the bags, an incidental revenue is derived from the refining of the water in which the bags have been washed, called "sweet water." The superintendent of one refinery said that the amount of sugar in this water would run as high as 3%.

In a circular issued by the Corn Products Refining Company, February 14th, 1923, there appears this line:

> **"Conservative soakage on wood barrels, $0.19 (per barrel)." (Based on the prevailing market of $3.10 cwt.)**

These are merely a few illustrations of the problem which confronts us on soakage. Refiner's syrups, glucose, molasses, condensed milk, maple sugar, figs, dates, pecans, etc., each of these has its particular loss, ranging all the way from a pound per barrel on pecans and a half to one pound per pail on maple sugar to from two to six pounds on syrups, condensed milk, etc., and on up to eight pounds and over on molasses. It has been noted in the preceding article of this series that in every case the shipper has been absolved from responsiblity for this loss by various expedients of taring or invoice-weighing.

Reducing Soakage Losses

Let us see if an anlysis of this phenomenon does not suggest some way in which many of the present excessive losses may be reduced to a minimum. Until the point of saturation is reached the loss through soakage is directly proportionate to the length of time the material has been standing, and the porosity of the container. On freshly-packed material the loss is usually slight; where fresh-packed is offered in competition with held or old crop material, the loss must not be lost sight of in the comparison of costs. Apart from this element of time there is no more potent influence than the porosity of the container in which the goods are packed.

Perhaps the best illustration of the extent to which soakage may be controlled by decreasing the porosity of the container may be taken from barreled condensed milk. The most satisfactory package for this material is the hard white oak so-called paraffin-lined barrel (the lining is accomplished by dumping 15 to 20 pounds of hot paraffin in the barrel and rolling it until the barrel has become thoroughly impregnated with the wax). Soakage on this type of barrel seldom exceeds one pound. A common substitute for the expensive hard white oak barrel is the gum oak barrel, paraffin-lined. Here the soakage will run as high as 1% or six pounds per barrel. The possibility of leakage is likewise greater, notwithstanding the efficacy of the wax liner. On the best qualities of *unlined* hard white oak the soakage averages 1½-2 pounds, while on the poorer grades it may amount to from 5 to 7 pounds.

(*Continued on page* 42)

Cost Control

The Twelfth Article of an Extensive Series on

Candy Factory Management Methods, Factory Practices Material Handling, Labor Management, Etc.

Based on personal interviews with manufacturing confectioners and a special investigation of their manufacturing problems

by Ralph G. Wells

Member Committee on Industrial and Commercial Planning, Boston Chamber of Commerce.
Member of Faculty, Boston University—College of Business Administration.
Formerly President National Association of Employment Managers.

Exclusively for The Manufacturing Confectioner

IN this day of ever-increasing competition, when selling prices cannot be advanced easily, the only way to maintain net profits and, therefore, the prosperity of the firm, is to keep costs down. This is a difficult problem under present conditions, but the experience of successful firms demonstrates not only that costs can be kept down but that they can be reduced by systematic cost control methods.

In order to do this, however, one must have accurate, detailed and comprehensive cost data as a basis from which to work. It is only by a careful analysis of all of the items making up the manufacturing costs, operating expenses, and administrative and sales overhead, that it is possible to search out the places wherein savings can be made without injury to the quality of the product or detriment to the growth of the business.

There is an element of danger in trying to reduce costs either in a haphazard or penurious manner or without due study of both cause and effect. Certainly it is poor judgment to save by the use of inferior materials or by the lowering of manufacturing standards. Manufacturers of small business acumen seem to think that cost reduction can only be accomplished by lowering the quality of material or skimping of the manufacturing process. Costs may be reduced in many other ways than these; and herein lies the great difference between the successful and progressive manufacturer and the old-fashioned plodders in this industry who are barely getting by. The former reduces his costs by the use of more modern methods: elimination of waste, careful planning of his business, an intimate knowledge of materials, the speeding up of production and increasing the output of his plant per worker and per dollar invested. The latter clings to his old-fashioned, unprogressive methods, endeavoring to offset his own shortcomings as a manager by cheapening his candy, through the use of inferior ingredients, the hiring of cheap help, or the skimping of his manufacturing and handling processes. Successful plants are continually reducing their unit costs without lowering the quality of the product, the material used, or altering the processes by which it is made. They may seem to spend more money, but such expenses are carefully planned so that their actual effect is not to increase the unit cost. Frequently the expenditure of additional money will increase the production or eliminate time losses or material wastes to such an extent that the net cost per piece is reduced.

In this article we are interested primarily in methods used to reduce or keep down manufacturing and running expenses. But as there can be no cost control without an accurate and detailed knowledge of costs, we are, therefore, interested first in cost accounting as a necessary foundation for cost control.

What Use Do You Make of Your Cost System?

Cost accounting, however, is merely a means to an end and is in itself of no value unless some definite use is made of the information

which it brings together. Unfortunately, many cost systems seem to have been developed and operated as if they were more important than the purpose for which they were installed. The justification for cost keeping and cost accounting is to secure such data and information as is needed to:

(a) Determine selling prices;
(b) Determine sources of profits and losses;
(c) Control of costs and keeping down expenses;
(d) Establish standard costs to be used by the production division as a check on the efficiency of each department;
(e) Indicating the most profitable items;
(f) Serve as a basis for budgetary control and preparing estimates of future expenditures;
(g) Serve as a basis for control statistics for the use of managing executives.

Profit and Loss Barometer

Adequate cost information enables the manufacturer to determine what parts of the plant are being run efficiently and what divisions are being conducted extravagantly. It provides a gauge by which the manufacturer may test his profits and determine from day to day whether he is making or losing money and where this is occurring.

The firm that has a good accounting system does not need to wait until the end of the year to find out whether or not money is being made. With accurate daily costs, showing exactly the amount of material, labor time, and overhead that is being expended, and the amount of candy that has been turned out in that day, the watchful superintendent or general manager can tell exactly whether or not the factory is making money. When this information is available daily he can take prompt steps to correct any adverse conditions.

A candy business without an adequate cost system is like a mariner at sea during a fog without a chart or compass. Unfortunately, many manufacturers do not know from day to day whether or not they are making money. They must wait for monthly or annual statements to know which way they are headed. This is one cause of financial disasters. Firms do not know until it is too late that they are losing money. Either because of lack of definite facts or because their system is too cumbersome, they have no way of knowing when or where money is being lost. Under modern simplified cost methods, the manufacturer can know every day what departments made money and what departments made or lost money on the previous day. Any cost system which fails to give this promptly should be discarded and replaced by a system that will give the desired information at once.

Will Locate Leaks

Perhaps the greatest advantage of a definite system of costs is that it indicates accurately and specifically just how the money is being expended and what items are too high, so that the watchful executive can study the excess expenditures either of time, of money, of material, or of labor, and cut them down immediately, thus insuring that costs will remain within profitable bounds.

Furthermore, every firm should be operated upon a system of budgetary control. This means that at the beginning of each season an estimate of the expenses that are necessary to run the plant throughout the season is made. This estimate is checked up and compared with previous expenses by the comptroller, and, when finally accepted, serves as a guide and a curb of the expenditures for each department. When once the estimates have been set up as a budget, no department is allowed to exceed any item without permission.

Since cost accounting is so vital a part of cost control, it is well to consider carefully the essential elements of an efficient and effective system. Several manufacturers were asked what features they considered the most important. From their replies the following list of essential features has been built up.

Seven Essentials of An Accounting System

The first essential of an effective accounting system is that it be simple, accurate, easily understood, and easily operated.

The second essential is that cost data and figures should be available immediately after work has been completed. Cost figures lose more than half their value if they are not available until two or three weeks after an operation has been performed. It is then too late to find out exactly the cause of any variations and, therefore, too late to correct the trouble. Unfortunately, many systems are so cumbersome in their operation that the manufacturing department does not know until the end of the month whether or not the work performed has been kept within the standard cost.

A third essential is that various items of expense and overhead should be distributed equitably over different classes of work and among the different departments, instead of being lumped together and charged in at a uniform percentage on all classes of candy alike. Equitable distribution cannot be secured if burden, or expense, or overhead are distributed by the same plan throughout the factory. The most accurate method of distributing overhead is to do so by what is called the production center plan, in which all expense items are classified and subdivided so that each production center is charged with its fair proportion of the general operating expenses.

It is a fallacy to lay down any general rule for the distribution of overhead, insisting that all overhead should be apportioned on the same basis throughout the plant. The method of distribution need not be the same in every department. As an illustration, in the enrober room overhead should be distributed on the basis of machine hours; i. e., the length of time that it takes each lot of candy to go through the en-

rober. In the hand-dipping and hand-packing room overhead should be distributed on the basis of labor hours or labor costs, while in the hard candy and special departments a portion of the overhead should be distributed on the basis of the length of time that it takes to cook a batch, and another part on the basis of the amount of hand work and labor hours that are required in finishing the batch. The rule to be adopted in the distribution of overhead is that overhead should be distributed in each department on that basis which will give the most equitable estimate of the amount of time and attention required in putting each batch through that department. This phase of accounting will be discussed more fully later on.

The fourth essential is that cost figures should be based on actual facts, instead of estimates or guesses. There is too much of a tendency to arrive at costs by estimates based on trial runs made under conditions which are not typical of the usual conditions. Of an even more dangerous type are those costs based on guesses made by some executive as to how much material is required and how much labor will be needed. No costs can be accurate unless they take into consideration all the errors and mistakes that are made in the factory under normal conditions as well as occasional emergencies such as break-downs, shortage of material, and spoiled batches. Trial runs are frequently inaccurate. They are made under the most favorable conditions that can be produced and do not represent the usual run of production. It is characteristic of both foremen and operatives that greater care than usual will be taken at such times. Accurate costs can be obtained only from actual figures of material used and labor required under every day conditions. It is essential to keep actual costs, even though they may be supplemented by time studies and trial runs.

The fifth essential is that the system be comprehensive and continuous, that it take into consideration all eventualities and all factors. While this does not mean that the actual costs must be kept for every batch of candy that goes through the plant, it does mean that the cost accounting system used must be in continuous operation throughout the year, so that every item of expense will be included in the system and definitely charged against some phase of the business. In order to be accurate, a cost accounting system must account for every dollar expended by the company for any purpose whatever. Each item of expense must eventually be charged in as item of cost.

The sixth essential is that standard costs be established for each kind of candy and for each operation and that these figures be easy to understand and sufficiently specific to enable those responsible for costs to locate the sources of any increase in expense. It should indicate constantly how much material and labor is being used for each operation each day. So far as the production department is concerned, it is better to express costs in units of material. of labor, of machine hours, and of hourly overhead, so that each department head can easily check upon the amount of labor or material that he is using and thus see whether or not costs are being kept within the standard. It complicates the situation and renders it more difficult if costs are expressed to him in dollars and cents, making frequent mathematical calculations necessary. Furthermore, it does not help the foreman or superintendent very much if he must wait until several weeks after a batch has been run to find out whether or not he kept within the standard.

The seventh essential is that the cost system should be tied in with the general accounting system of the company, in order to insure that all expenses are properly accounted for and charged to the right accounts. There are other reasons, such as giving an accurate basis for financial statements and tax returns. The tying of the cost system in with the general books also insures greater accuracy.

Manufacturers whose cost systems do not measure up to the foregoing standard should consider seriously the need of correcting any shortcomings before another busy season sets in.

It is hardly necessary in this paper to describe in detail the various cost methods used in the confectionery industry. This is a matter of common knowledge, as numerous magazine articles and one or two books dealing specifically with candy cost keeping have been published in recent years. The particular system used does not seem to make much difference so long as it accomplishes the desired results and conforms to the general principles enumerated above.

There are, however, one or two controversial questions which were mentioned by nearly all of the cost men interviewed in this industry. These include the distribution of overhead, methods of collecting costs, and the value of using a machine rate hour.

The next chapter on "Distributing Overhead" takes up a much discussed subject and one which is perhaps the most vital in connection with the application of cost data. The Manufacturing Confectioner would like to receive the comments from our readers on various phases of this subject of cost control—especially the distribution of overhead expense. It is possible and probable that our industry will come to adopt more standardized practice on these essential points in determining costs.—Editor.

Distributing Overhead

In order to avoid inaccuracies in the distribution of overhead or burden it is desirable if possible to classify overhead expenses and indirect items so that as many of them as can will be changed to specific operation or else apportioned to the production center, or department where they properly belong. It is the growing practice to charge as much as is possible direct to the operations or departments responsible instead of putting everything into overhead.

There are several methods used for distributing overhead. The least satisfactory is the common practice of simply charging in all overhead at a uniform rate, either on basis of total manufacturing costs or percentage on raw materials. This system is not at all accurate because it does not take into consideration the fact that some goods require a great deal more manipulation and supervision in their manufacture than others.

As an illustration, some products have to be stored in a drying or seasoning room for several days and perhaps handled two or three times during this period. Yet it is seldom that the direct costs show any definite charge for this period. As a matter of fact, such goods cost a great deal more than figures ordinarily show, because they cause a larger portion of the expense of maintaining a dry room and general labor that is used in transporting and handling. Such goods do not only take up room but they also tie up equipment, and frequently hold up production of other candies which do not have to be kept in seasoning room for such a length of time. The only way of determining the accurate costs of such pieces is to figure out the expense of maintaining such a room and charge it in as a separate item on the basis of the time which the goods must stay in storage.

Many firms get good results, by dividing up their plants into production centers and figuring out the amount of factory overhead and indirect expenses that can be charged directly to such production centers. In this way a large portion of overhead which was formerly charged indiscriminately to all kinds of candy is assessed directly against those pieces which are the real causes for the specific expenditures. The practice of distributing by production centers is growing and has many arguments in its favor. No other method is quite so flexible.

When it comes to the actual apportioning of overhead expenses distributed either by departments or production centers, this apportionment may be made either on the basis of labor hours, labor costs, quantity of material, or machine hours. The rule as stated before is to use that method of apportionment in each department which will most fairly represent the amount of time, attention, and supervision required by the product as it goes through that particular production center. It is a mistake to try to distribute factory burden by the same method throughout the entire plant.

General Expenses Subdivided

It will facilitate accurate distribution of overhead if the indirect costs and general expenses of the business are subdivided into the following classifications:

Departmental Overhead. This includes all items of expense and overhead which can be charged specifically to the department or production center, and which cannot be distributed definitely on articles through machine or labor cost. A large part of expense frequently included in Departmental overhead should really be charged in as machine cost described further along in this article.

General Factory Overhead includes items which cannot be subdivided equitably among the departments.

Selling Expense includes all of the items chargeable to sales promotion. This includes advertising, salesmen expenses, costs of samples and of handling customers' accounts, as well as any overhead that may be properly charged to the sales department.

Administrative Overhead includes the salaries of general officials, general office rent and expense, bad debts, interest on loans, income tax, and similar items which cannot be distributed through any of the other channels for taking care of overhead.

Departmental Overhead

Departmental overhead should be distributed as suggested above. If possible, general factory overhead should be absorbed into the departmental overhead and distributed in the same way. Selling expense constitutes a separate charge which must be added after the gross manufacturing cost has been determined. Many firms now make the practice of charging all goods made to the sales department at a gross cost and then keeping a separate set of books for the sales department, in which sales are debited with all goods manufactured and credited with goods sold at a certain rate. In some ways this has an element of unfairness in it because it makes the sales account look as if the sales department were making all the profit. In any event, selling expense should be charged in as a separate item of overhead added to the general manufacturing cost. The administrative expense is the final item that is charged in, and before the gross cost of manufacturing, selling, and of doing business can be determined. As a general rule, both the selling expense and the administrative overhead are charged in on the basis of total cost.

There has grown up in recent years a practice of carrying what is known as an idle ma-

chine and equipment account. Whenever machines, equipment, or any portion of the factory are idle, due to lack of business or to dull periods, the overhead or expense of carrying this idle equipment and machinery is charged into this account. The former practice was to charge each department with its own idle machines, which is unfair, as the production department should not be penalized because the sales department cannot sell the goods, or because the business management does not display sufficient acumen to keep the plant working full time.

Furthermore, if the overhead and cost of idle machinery and equipment are charged against the production department, it will make the cost of manufacturing certain items seem much higher during dull periods than during rush periods. This is not true. As a matter of fact, while the company makes more money when the factory is running full and its overhead expenses are less per pound turned out, it actually costs less to manufacture certain classes of goods during slack periods when long runs can be put through without interruption. Moreover, the manufacturer who includes in his costs of manufacturing the charges for idle machines and idle equipment will find his costs so much higher during dull periods that if he endeavors to secure a fair profit on these costs his prices are apt to be too high to secure the business.

Care must be exercised, however, to see that this practice does not lead to charging to the idle machinery account idleness of machines which is due to poor planning or improper supervision on the part of the production department. If a machine breaks down because it has been improperly inspected, or because the foreman has not exercised correct supervision over his workers, this idle time should be charged to the department, in order to show up the inefficiency of the foreman in handling his machines. The same is true if the idleness is due to failure to lay out work properly.

Machine Hour Rate

Many plants today use a machine hour rate as a cost element. It really is a method of collecting all of the costs directly connected with a machine operation and distributing them over the product going through the machine in proportion to the time required to turn out the product. Such a rate frequently includes the labor cost of the operatives at work on the machines, although this is not necessary. As a general rule, all overhead items that can be directly charged against the machine are also included.

This covers all of the expenses that can be properly charged to a machine—an item that is frequently not segregated and is usually charged in as general expense. Much more accurate costs can be secured by determining the exact hourly expense of running and maintaining a machine and charging every batch of candy that goes through each with the appropriate machine hour cost in the same way that a batch of candy would be debited with labor charge cost.

Machine costs include:

(a) Interest on the investment in the machine;
(b) Pro rata share of fire, compensation or other insurance that can be definitely allocated to the machine;
(c) Pro rata share of taxes, if any;
(d) Cost of repairs, maintenance, and upkeep;
(e) Depreciation, obsolescence;
(f) Power and heat;
(g) Rental charge for the amount of floor space occupied;
(h) Supplies needed for the operation of a machine;
(i) Miscellaneous or indirect expenses of department that can be properly apportioned to machine.

How One Firm Finds Its Costs

One successful firm has developed an interesting method of obtaining costs. It is similar in many respects to methods used by other confectionery plants. It is as follows:

Data for determining material costs are secured in two ways: 1st, frequent trial runs are made of the definite quantities of the various kinds of candies produced. Exact known quantities of each ingredient are made into a batch. Waste or scrap and the total amount of finished product made from each batch are noted carefully. The results of these runs are entered on sheets similar to the one shown in Figure 1.

As a further check, a careful account of all material used for different items is kept. Once a month the quantity of each item actually manufactured and turned over to the packing department is compared with the amount of material that has been issued for these items. This comparison shows the number of pounds of finished goods secured from the material used. Department heads report all spoiled batches and the quantities of waste and scrap produced. These are also compared with the amount of material used. This shows the percentage of waste, from which is computed the allowance that must be made for spoiled batches and other losses, in figuring the output to be derived from certain quantities of material.

Labor costs are determined much in the same way. Three men in this factory do nothing else except the making of time studies upon which costs are based. These studies are made in considerable detail. They extend over a long

enough period to make sure that all ordinary factors of delay and lost time are taken into consideration. After a series of time studies have been made of any one piece, the results are summarized and entered on the reverse side of the cost data sheet for that piece, which is shown in cut No. 2.

Here again, the estimated costs, as determined by time studies, are checked against costs by comparing the actual output of each production center with the amount of payroll for that center.

This firm distributes its overhead as a fixed percentage of labor costs. Labor hours are not used as a basis for distribution, because nearly all of their labor is on a piece-work basis. For all practical purposes labor cost is a fair enough gauge of the amount of overhead which should be charged to any one item. Furthermore, piece rates and wage scales are based on time

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BRAND **NAME**

	Actual Figure	Revised	Revised	Revised
Selling price per		Before Dipping		
Excise Tax		After "		
Net Selling Price				
Cost				
Trading Profit				
% Trading Profit				

Lbs.	Oz.	Misc.	MATERIAL	Unit	Price	Credit	Debit	Price	Credit	Debit	Price	Credit	Debit

Quan.	Kind	PACKAGE	Unit	Price
		Boxes, Pails, & Cans		
		Trays		
		Layers		
		Layers		
		Creases		
		Cups		
		Foil		
		Padding		
		Labels		
		Twine		

LABOR	LABOR	LABOR	
OVERHEAD	OVERHEAD	OVERHEAD	
TOTAL	TOTAL	TOTAL	

required for the operation and practically represent labor hours. One advantage of using labor costs as a basis for distributing overhead is that these figures are computed anyway for the payroll and it is more economical to use them than to duplicate effort by making up a different set of figures solely for the sake of distributing overhead in another way. The cost man of this firm believes that there would not be enough difference in the figures to pay for additional cost of a more complicated method.

In comparing various systems of cost keeping and the collecting of cost data, one has to be careful not to be carried away by the desire to get an absolutely accurate and theoretically correct method. There is, unfortunately, a tendency on the part of cost accountants to insist on absolute accuracy instead of realizing that after all various refinements and elaborate sys-

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LABOR and OVERHEAD

DEPARTMENTS and OPERATIONS	Date				Date				Date			
	LABOR		OVERHEAD		LABOR		OVERHEAD		LABOR		OVERHEAD	
	RATE	TOTAL	%	TOTAL	RATE	TOTAL	%	TOTAL	RATE	TOTAL	%	TOTAL
Nut Room—Cleaning & Cutting												
Roasting—Clean & Roasting												
Revolving Pan												
Blanching												
Cream Boil—Boil & Beating												
Making (P'Nut Car.)												
M.M.—Making												
Cream & Starch												
Melting—Depositing												
Nut Dropping												
Car.—Making & Cutting												
Nougat—Making & Cutting												
Hard Candy—Making & Cutting												
Enrober Dip.—Dipping												
Enrober Pack—Wrapping												
Packing												
Topping & Tying												
Packing Trays												
Labelling												
Sealing												
Hand Dip—Dipping												
Slipping Trays												
Hand Pack—Wrapping												
Packing												
Topping & Tying												
Labelling												
Total												

	PACKAGE	PRICE	
Material			
Labor			
Overhead			
Package Price per lb.			

tems do not give figures that differ much from figures arrived at by some other system. As one manufacturer expressed it, "What is the use of spending more money and a lot of time to get practically the same figures by a more elaborate method?" Simplicity should be an essential characteristic of any cost system.

There is danger, however, of thinking that it is possible to secure accurate costs without some systematic method of doing it and without keeping detailed records of the quantities of material required for each batch and the amount of labor expended upon the work in the factory. This necessarily involves considerable mathematical calculation, but it cannot be escaped. Red tape and elaboration consists more in making too many duplicating entries or in having too many checks as an insurance against possible error.

In the plant mentioned above the labor costs for cream boiling and marshmallow work is determined by dividing the total poundage into the actual payroll. Cost of dipping varies according to the size of pieces and the complexity of strings. Clusters of nuts are much more expensive to dip than single pieces. By actual time study, complicated strings on chocolates add greatly to the cost. As an illustration, two pieces of practically the same size, shape and weight are dipped by hand. One has just an ordinary string, the other a much more complicated string. The first piece with the simple string costs 42 cents per thousand pieces to dip, while the same piece with the more complicated string costs 80 cents per thousand pieces to dip. Furthermore, there is a decided disadvantage to complicated stringing. They are more tiring to the dipper, as she has to hold her arm extended while she is putting the strings on the pieces. Many dippers complain of fatigue and of pains under the arms when they are doing these more complicated pieces.

Cost data for each piece is kept in a separate folder. In this folder are collected sheets similar to the one shown in Figures 1 and 2. Some folders have data running back for several years. This gives a great deal of comparative cost data and is exceedingly helpful when new pieces are being planned or when the firm is endeavoring to work out an assortment of candies to be sold at a given price.

On such items as nuts or fruits, which have to be assorted and cleaned, this firm finds it essential to compute the cost on the basis of the actual weight of cleaned material secured from a batch. Thus, their cost on nuts is made up of the following items:

1. Original purchase price.
2. Freight and other transportation charges.
3. Handling and storage costs.
4. Labor on cleaning and cutting.

After all these figures have been added, the cost per pound is determined by dividing the amount of cleaned and cut nuts secured from each batch.

Collecting Cost Data

As a result of the various studies made of this question, the following suggestions are offered as a means of collecting the data on costs and cost control:

(a) Sheets similar to the accompanying illustrations should be prepared which will enable the bringing together of all of the details of all the items entering into the manufacturing costs of any variety of candy. These sheets should be corrected and brought up to date at least once a year or as frequently as actual costs show any marked variation from the previous computation.

(b) In order to keep accurate track of all material costs, no materials should be issued without requisitions, and requisitions should be made out only by the production or planning department. In order to do this easily, each making order should carry with it a standard requisition for the actual amount of material needed for the number of batches that are to be made. If, because of the size of the plant or the location of the store-room, it is necessary to keep the supplies in the department, these can be issued to the department weekly on about the same basis by which petty cash is issued to cashiers. Accounting for such sub-stores can be simplified by using the petty cash method, arranging for them always to have on hand a standard amount of each material, either in requisitions or in actual material. Sub-stores can be replenished from the main store room on presentation of the requisition issued with the making order.

An accurate record should be kept of all materials used and of the quantities required for each lot of candy put through. By knowing what quantities of various materials are issued for the batches to be made, and by knowing the quantities of various kinds of finished product delivered to the packing or shipping room, it is a simple matter to determine the material costs without following each batch through the plant. Once a week a marker or tracer of some kind should be sent through to separate the candy produced from material previously issued and the candy made from material issued subsequently.

The labor cost on all work done on a piecework basis is easily computed from the amounts paid out for this kind of work. It is essential, however, in this case that we take into consideration the fact that a certain percentage of the money paid for different operations is lost further along in the process by spoiling or scrapping of candy. It is, therefore, necessary to know accurately what percentage of pieces leaving, say, the cream and starch room, is lost

in subsequent processes in order that the labor cost may readily be determined. Many firms deceive themselves in estimating their costs because they do not take into consideration the amount of labor that is lost later on in seconds and in scrap.

Where the labor is paid by the hour, the costs must be collected from either the time cards or payroll sheets. This necessitates keeping track of the actual amount of time spent by workers on each lot. As a check for accuracy the total labor costs thus accumulated should be compared with the total payroll for the same period.

It is further recommended that in addition to labor and material costs, machine costs, figured on the basis suggested earlier in this article, be used. The advantage is that many expenses which in the past have ordinarily been charged to general overhead can—by the use of the machine hour rate—be charged directly to the different kinds of candy, in proportion to the amount of machine work that they require. Unless this practice is followed, the cost figures on candies which require comparatively little machine work will carry an undue proportion of the total machine costs of the plant.

Overhead should be distributed as suggested in the discussion of that subject.

Controlling Costs

Next in importance to the method of arriving at costs is the question as to what is the best method of using the information obtained to control costs and keep down expense. The following list indicates what some firms are doing:

1st: Costs are used, of course, as a basis for determining selling prices, the probable amount of profit, and where the figures are tied in with the books they serve as a check on waste, intangible losses, and dishonest use of time and material.

2nd: By comparing the known actual costs of producing and selling an item against the amount of cash actually received for that class of goods, it is possible to determine what lines are the most profitable and what kinds are unprofitable.

3rd: If the cost data is carefully analyzed and tabulated so as to show on what items too much money is being spent, the management can use such a list as a means of cutting down excess expenditures.

4th: After the system giving actual costs has been in operation a sufficient length of time it is then possible to build up from the information so accumulated definite and accurate cost standards which can be used as a guide and control check in the operation of each phase of the business.

5th: As previously suggested, the facts secured from the operation of the cost system provide a reliable foundation upon which budgets can be built up to control future financial operations of the business. As a matter of fact, a financial budget is nothing more than the setting up of a standard cost for the operation of the business, so that standard costs for operations and budget standards for departmental and company expenses are closely related.

6th: Cost statistics are absolutely essential as a basis upon which plans for the future operation of the business can be made. They are also helpful in determining whether suggested improvements are worth while, and whether expenditures for such improvements can be justified on a financial basis.

From the standpoint of the production department, however, the greatest value of cost accounting is to have a system that will give immediate reliable records as a basis for control of cost factors. This is best accomplished by setting up standards for each individual operation based on past performance. Where standard costs are being used to the greatest advantage, each making order given out has written on it code figures which indicate the exact quantity of each material to be used, the percentage of waste, the amount of finished product that must be secured, and the standard number of labor hours of each class of employes allowed for making the candy. This data is usually copied onto the order from a book of standard costs by a clerk.

With these standard cost figures in front of him, the foreman has a definite guide showing what he must accomplish. He is required to report promptly any variation from standard with full explanation and therefore knows that all variations will be recorded. As a continuous record is kept of all variations, he appreciates that lower costs will show up to his credit. He is, therefore, keenly interested in keeping the cost of every single batch down to the lowest point consistent with quality.

Furthermore, when the cost of any batch exceeds this standard, he knows immediately without waiting for anyone to tell him and is sure to study into the reasons then and there, so as to be able to prevent their recurrence in the future.

This method places the responsibility for cost control definitely upon the operating head of the department. It keeps him supplied automatically with the information needed to control his costs, so that the responsibility cannot be shifted to someone else. There are some cost systems where the amounts of material used and the labor time, together with other items of cost, must first be sent to the cost department, there brought together, translated into dollars and cents items and then compared with previous costs, and finally sent to the plant manager or superintendent, who when he gets around to it later calls in the foreman and asks

him how it happened. Sometimes this takes two or three weeks and is obviously too slow a method of controlling costs to be genuinely effective.

Another claim for standard costs by its supporters is that it simplifies bookkeeping, that it is possible to so set up a system of accounts that all orders are put through the books at a standard cost figure, and any variations from the standard costs are taken care of at the end of each month by a few simple adjusting accounts. It is further claimed that the use of such adjusting accounts plays up more strongly any losses or gains.

Discussing Costs with Foreman

The writer recently attended an annual meeting of the foremen and superintendents of a certain plant where costs are kept along the lines indicated above. Perhaps the most interesting phase of this meeting was the way in which the problem of operating costs was analyzed and discussed. On the walls of the room where the meetings were held were a number of charts upon which actual and standard costs for the entire year were compared in a vivid manner. These charts, by the use of curves, compared for each month of the year—

(a) Actual cost against standard cost for each one of the principal products made by the company.

(b) Actual costs against standard by departments and classified according to product.

(c) Actual output secured per pound of material used as against the standard.

(d) Actual waste and scrap against the standard allowance.

(e) Actual departmental overhead for which the foreman is responsible as against the standard or budget allowance.

(f) Quantity and cost of supplies and indirect material used as against the standard.

(g) Amount and cost of indirect labor and supervision as against the standard.

There were also charts bringing together and showing the figures for the entire plant based on the above comparisons.

In addition to a curve representing the standard and the actual figures, each chart had on it in a different color a curve which represented the variations of the previous year, so that it was possible not only to see the loss or gain that had been made this year, but also to judge how it compared with results secured in previous years. To add to the interest of these charts, each variation of any importance was marked with a code signal giving the reason for these variations.

These charts were not made up merely for this meeting. They were regular charts in use by this company all of the time, posted prominently in the plant manager's office and kept up to date so that every member of the supervisory force can see at a glance the exact situation of his particular division of the company. The proof of the value of such careful analysis and study is shown by the fact that the company was able last August to reduce its figures for standard costs on an average of about 4% on nearly every class of goods made, and that since that reduction nearly all departments are keeping their actual costs below the new standard. Fluctuations in material value or market price do not affect these standards, as all standards are expressed in units of material and labor hours.

This incident, and the experiences of many other manufacturers, shows conclusively that it pays to analyze and study manufacturing costs and to check up systematically and continuously every item of cost. Eternal vigilance and constant watchfulness over small details based upon immediate accurate information as to actual costs seems to be the best method of keeping costs down and of reducing expenses.

Dry Rooms

Their Construction and Operation

By George J. Shaley

A MOP or cloth will dry the water from a smooth surface and do it very effectually if well applied and the surface of application changed about, but it will do only so much and then the water must be wrung out or removed in some other way. Candy cast in starch is dried by that starch. The proportion of the piece which is exposed to the air is necessarily very much less than that which comes in direct contact with the starch. Therefore, when planning to dry starch-cast goods the drying of the starch and not the candy must be figured on. The starch and the air are analogous to the mop or cloth. Both should be dry in the beginning and should be changed or "wrung out" at intervals; the ideal plan is to make the drying of the air a constant operation. The standard dehumidifying unit or the condensing coil "wrings" the moisture out of the air, while the recirculating and fresh supply of air "replaces or changes it." The condensing coil is a patented process, but a dehumidifying unit may be had from a number of sources.

When a dry room is filled with starch boards of fresh goods or other moisture bearing material there enters a fixed quantity of water which the air in the dry room must absorb and carry away in the form of moisture or water vapor. The air will hold a definite number of grains of water per cubic foot at any given temperature. The higher the temperature the greater the power of moisture absorption. If the air becomes saturated at a given degree and is then cooled below this point the water will be precipitated.

It must also be borne in mind that the process of moisture absorption in itself has a decided cooling effect on the air. Moist air is lighter than dry air, but the contraction caused by cooling may easily overcome the difference.

With these facts in mind, consideration must be given to the nature of the material to be dried. Anything with a porous open structure such as starch may be dried as quickly as possible, provided the heat employed is not greater than the nature of the material will stand. In the candy industry the moulding starch is generally mixed with a certain percentage of "tailings" from the cast goods. These "tailings" have their individual melting points and if the starch is subjected to a temperature in excess of these it will naturally become sticky. If a sufficiently high temperature is reached the starch itself will dextrinize and turn sticky and yellow, but we have as yet seen no dry room in a candy factory where this was possible.

Gum drop scraps dry out and become glassy, so that no apparent melting is discernible even at 170° F., but cream is a very different matter and will often soften and cause trouble at 150° F., and if centers of the soft type have been deposited in the starch the danger point may be very much lower.

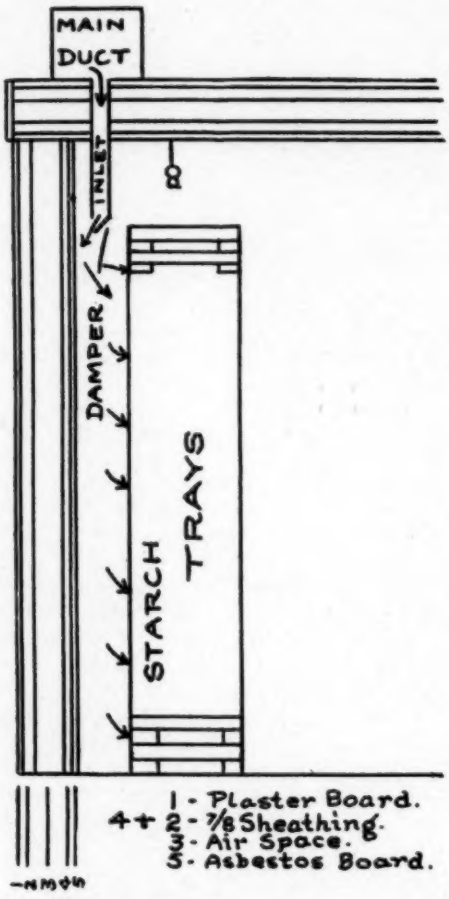
In the case of gums, the drying problem assumes a different aspect. Too rapid drying under the conditions obtaining in what is generally considered a good dry room will cause a leathery or hard glassy coat to form on the surface and this effectually seals the piece so that the moisture in the center cannot escape. Later when the goods are taken from starch, sugared and stored away, this moisture slowly softens the surface and as it dries from the outside loosens the sugar and causes "sweaty" goods.

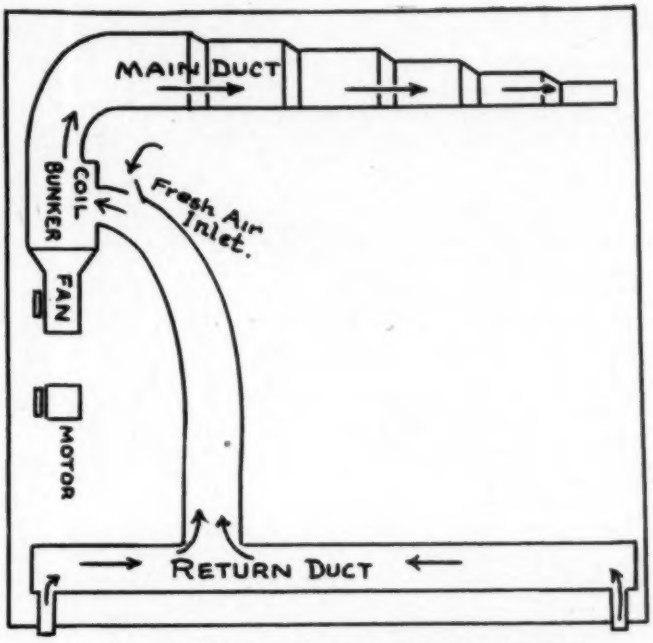
An intense heat does not always cause too rapid drying. The farther from the saturation point the air in the room is, the more rapidly it will absorb moisture; therefore, an extremely low humidity with the normal heat will cause case hardening quite as effectually as a high temperature.

From all these facts it becomes apparent that the most desirable dry room is one that maintains a uniform heat in every part and at the same time is constantly provided with fresh air. Under ordinary conditions room air is sufficiently dry for the confectioner's use, as in the process of heating the relative humidity is sufficiently reduced. Let us say that it is summer and the air in the factory is 89° F. and shows 80% humidity. This air is drawn into the dryer and raised to 140° F. The actual amount of moisture has not changed per cubic foot of air, but the air has increased in bulk and the relative humidity therefore fallen to a point satisfactory for the drying of gums.

Construction of Dry Rooms

The construction of a dry room productive of maximum efficiency at a minimum cost has been made a matter of special engineering and if possible it is best to call in an engineer specializing in this work, but there are fundamentals, very often disregarded in the confectionery plants of the country, which can be applied to any dry room.





Layout of ducts where fan and coils are installed on roof of dry room.

From the standpoint of conserving power, the location selected should be one that will allow of a thorough insulation of all sides of the room including the floor and ceiling. A concrete floor is not good. The power of this material to absorb heat is high and the cost of heating the room therefore greatly increased.

Where possible design the room and place the door in such a way as to enable the trays to be removed quickly. The form should be such that a day's work may be removed when ready without shifting any of the other trays or exposing them to the cooling effect of open doors. If possible have a partition between each day's work and a door opening from the outside into this division.

The rooms should be lighted with electric light and the snap switch which controls it located outside the room. Starch when dry and finely divided is capable of exploding with extreme violence, and while a plant may go for years without an accident of this kind it is impossible to tell at what moment the right mixture of air and starch may occur. Dust explosions are a constant dread to the refineries where starch is made. The spark of a snap electric light switch is often enough to start the whole thing going.

The ceiling of the average plant is generally too high for efficient operation of a dry room and therefore a false ceiling should be installed, the exact height of this is governed by several elements. From the drying angle alone it is best to have it clear the tops of the trays by about 18 inches, but this cannot always be, as in a plant equipped with sprinklers the underwriters demand a certain clearance generally from 18 inches to 3 feet.

A simple, efficient and safe dry room may be built as follows:

Erect a frame of 2 x 4s, placing the joists in such a way that the 4 inch dimension will decide the thickness of the wall. Sheath this frame inside and out including the false ceiling with matched ⅞ boards which have been *very carefully seasoned.* Cover the entire outside with plaster or beaver board and the entire inside with asbestos board. This arrangement will give a very thorough insulation inasmuch as there is 4 inches of dead air space tightly enclosed within the walls proper. If a more permanent construction is desired the walls may be built of hollow tile and that in turn covered as described above.

Figure carefully the exact capacity of your room and the amount of space which will be occupied by the boards when placed in the room for drying. The difference will of course be the amount of air in the room when in operation. This air should be entirely changed every one and one-half minutes.

It is possible to purchase a blower and steam coils which as a unit will be guaranteed to deliver a certain fixed number of cubic feet per minute of air at any given temperature. After

the amount of air to be moved in the dry room has been determined, as noted above, the size of the equipment necessary to do this, and keep the room at 140° or other temperature desired, can easily be determined by simple arithmetic.

Fan and coils should be set as close to the point at which air is to be admitted to the room as possible and all ducts should be straight or where it is necessary to change their direction should turn in wide curves to prevent back pressure.

The height of an average stack of starch trays is about six feet, and it is desirable that the contents be dried equally in every tray. In fact if uniform goods are to be had it is imperative. In order to accomplish this the air must strike every tray equally and be the same in humidity and temperature. There are many ways in which this may be accomplished, but one of the simplest is to use the trays themselves as baffles.

If the air is heated to 140° F. and changed every one and one-half minutes it will have a very quick passage over the goods and lose little of its heat; this means that the bottom and top of the room will show a temperature not varying by more than two or three degrees.

The incoming air duct should lie along the roof of the dry room and taper throughout its entire length. Every five feet (center to center) an inlet should lead from the bottom of this duct through the roof of the dry room and extend down to a point level with the top tray of the stacks to be dried. The inlets are best made with a rectilinear cross section 13 by 4 inches and the main duct should be reduced in size just beyond the point at which the inlet draws off. This reduction should leave the capacity of the next section of the main duct just sufficient to carry the air remaining after the inlet has been filled. It is necessary to so taper or choke the duct, or all the air will rush past the first inlet and crowd through the last two or three. It is well to provide the inner end of each inlet with a damper to control the air force and this should be so planned that it will tend to drive the air slightly in toward the wall of the dry room. If this is neglected the out rush of air is likely to disturb the starch in the upper trays.

This same arrangement should be duplicated on the opposite side of the room except that the main duct is to be connected to the intake side of the fan and a door connecting with the outside air left in the side of the main return duct. It is also well to have two small openings (12 x 24 inches) one in each corner of the room at the floor level on the outlet side. These are to connect also with the main return.

The result of this arrangement will be that when stacks of boards are rolled into the room and piled close together, end to end, along the intake wall and about fourteen inches from it the air will be blown down behind them and forced across the room between the trays. The air leaving through the outlets will be recirculated and by leaving the door in the return duct open any quantity of fresh air found necessary may be admitted. Once the air in the room and the starch is heated to the temperature of the incoming air very little heat steam will be necessary to hold them there.

The size of the room will of course necessitate variations of this arrangement, but the principle should be maintained. For a permanent layout which will operate no matter how few trays are in the room it is possible to extend the inlets down the wall to three different levels. At each level a metal box running the entire length of the wall is provided to receive the output of the ducts. The side of these boxes facing the open room is perforated with inch holes which distribute the air equally. A room too large for this method of arrangement may be divided into aisles and the inlets and outlets arranged in these.

The underlying points of the entire proposition are:

1. *A moderately low humidity.*
2. *A heat suitable to the material to dry.*
3. *A thorough rapid circulation of the air.*

In this connection it must be remembered that the air as it passes over the goods not only absorbs moisture, so increasing its relative humidity, but in the process of absorption is cooled and this reduction in temperature serves to still further increase its humidity. A large volume of air passing over the goods has little time for absorption per cubic foot and therefore its constants change little and the condition of the air remains essentially the same from inlet to outlet.

4. *Thorough insulation of the room to conserve steam and preserve uniformity.*
5. *Proper replacement of a part of the air.*

Thermostatic controls can be purchased which will regulate the steam in the bunker coils and so preserve uniformity and save steam. They are very useful and when provided by a good reliable house are thoroughly dependable.

NEXT MONTH:

Fondant in Principle and Practice

Machines — A Factor in Holding Men

By R. B. Williams

Consider also the condition of your machines; are they fit to produce the work you expect from your men?

MUCH has been, and is being said relative to surmounting the existing shortage in the supply of common and semi-skilled labor through the introduction of machines, more machines—and still more machines. They point the way to greater independence of that expensive element—common labor—and at the same time making for increased production and lessened costs.

* * *

And that same element—machines—can be made to increase the workman's morale and decrease the labor turn-over. After all—the greatest problem confronting the management of any plant, mill or factory, is that of *creating the desire* to work. If every management could accomplish that one thing—create the desire on the part of their employees to work—their turn-over would be lowered to the irreducible minimum and a great deal of money, time and effort could be expended on other and possibly more fruitful ends.

In considering the creation of desire for work we find three subconscious elements that affect such a desire. These elements are: ventilation, light and noise. Without proper ventilation, physical endurance is cut down, which condition is reflected on the production charts. Light is an equally important factor in determining the productivity of human labor. Noise is a third element that subconsciously cuts down the efficiency of the workman, affecting both his own and his company's earning capacity. The betterment of any one of these three elements—or all of them—will do much towards bringing production to its maximum.

Consciously, workmen demand six major things, the absence of any one of which will materially contribute to labor turn-over. The six elements are: first: Fair Wages; second: Harmonious Surroundings; third: Security of Position; fourth: Possibility of Advancement; fifth: Scope for Self-expression; sixth: Inspiring Leadership.

It will be seen immediately that the application of machinery to these elements will not, in any way, have anything to do with the last and more important factor; Inspiring Leadership. It does, however, affect all other factors.

To the end of illustration we will take the experience of an industrial engineer for a large manufacturing plant in Chicago making automatic telephones. Practically all of the workmen operate on what they know to be a "quota basis." That is, each man is given a stipulated amount of work to do in a given period. His production, over and above that quota warrants him increased compensation. Hence it is, the interest of the workman lies in how much he can produce over a certain amount, for he realizes that the "over-production" brings a higher rate than that which is under his established quota.

For several months his punch press operators had been grumbling because they found it impossible to get into the "extra money." They could not meet and go over their quota. Because of this, many of them felt that they were not receiving sufficient compensation and quit to find work elsewhere. This condition continued until the labor turn-over in that particular department became alarmingly high and was beginning to affect the morale of other departments. Motors, machines, line-shaft bearings and pulleys were examined thoroughly, but yielded no cause for the decreased production. Finally the matter of belt slippage was studied, which was found to be losing more than fifteen per cent of the power generated. The ample power of the motor was not reaching the machines. Chain drives were installed forthwith; with the result that not only was the production of the department increased fifteen per cent, but the men were in a position to go over their quota every month and do what they termed "getting into the extra money."

Here we find the two elements "fair wage" and "scope for self-expression" brought within reach of the workmen by the introduction and application of a device that would utilize every ounce of power generated through eliminating slippage. With the possibility for faster work and "self-expression" comes "security of position" and "possibility for advancement." There remained for that department only the one element that machines could not provide—"inspiring leadership"—and that factor I will not deny my friend, for he was, truth to tell, a true executive.

Not long ago I attended the brick and clay manufacturers' convention in Cleveland. While there, one of Cleveland's brick and tile manufacturers told me what similar change in mechanical equipment had done for his men.

Prior to its installation this firm had employed a rope drive. And rope drives, while they can go around all sorts of corners and have a number of features in their favor, do take up a great deal of room. The change in power transmission was made for economical reasons only. However, after having made the installation he found that the small shed which had heretofore housed the bulky transmission was now surplus equipment. The shed, or transmission house, thus released was converted into a wash-room for the men. And today (according to this manufacturer's statement) he is the only brick and tile plant in the city of Cleveland that has a wash-room for the men. It is a source of pride to him—and a thoroughly appreciated convenience for the men.

* * *

Supplanting common labor, so far as possible, through the introduction of mechanical means is the most advisable step any manufacturer can make, not only for the present time but for the future. However, in times of labor shortage, it behooves every employer to take particular pains to create the desire to work on the part of his semi-skilled and skilled labor. Much can be done to this end by the elimination of detrimental elements and the application of machinery and labor aiding devices. Not only will certain machinery and devices affect the ventilation, light and noise of a plant, but in almost every case will heighten the five of the six conscious elements. The sixth—that of inspiring leadership, depends entirely upon your ability. The other five (or eight) remain only on your *will.*—*From Industrial Management.*

What Shall the Foreman Study?

The Third of a Series of Twelve Articles on Foremanship

By J. K. Novins

STARTING out to plan a course of study for its factory foremen, the management faces a pretty stiff problem. Although foreman training is now in vogue in a number of plants, large and small, throughout the country, it cannot be said that a strictly standardized course of foreman training has yet been developed. Attempts in this direction have been made by the federal government, state and private institutions, and by individual firms, yet a great deal has been left to the individual initiative of the employment manager, or whoever is in charge of foreman study. The nature of the industry, the size of the plant, and the experience and educational equipment of the foremen are factors that enter into consideration.

Before the management plans such training it should make a survey of the conditions in the plant with a view to making the study meet a worthwhile purpose. It should also study the educational needs of the individual foreman. It is a known fact that the average foreman is averse to book study. More often he is skeptical about theory. He is usually an ex-workman who knows his particular job thoroughly and he is apt to resent instruction by someone who may know all about factory organization and production factors but who can be told a thing or two about the particular job by the foreman himself.

Arousing Foreman's Interest in Training

While it is often true that the foreman does not always anticipate any substantial benefits from a course of study, especially if it has no direct bearing on his particular job, yet the management should consult the foreman on the matter. It must be remembered that no foreman training will be successful unless the foreman's interest is aroused. In most plants foreman training is entirely voluntary, and unless the study is made interesting enough many foremen will stay away or pursue the studies with only half-hearted interest.

Before enumerating the subject matter which should form the backbone of foreman training, let us ask ourselves the question, "What should be the chief object, or objects, of our foreman training course?"

The question is answered in a report issued by the Federal Board for Vocational Education, in which the objects are listed as follows:

1. The material presented in the course must meet a real vocational need.
2. In order to do this it must be specialized in terms of the particular occupation followed by the members of the group to which it is given.
3. The members of the group to which it is given must either have a common vocational aim or a common background of the same kind of vocational experience.
4. The membership of the group to which the course is given must be confined to individuals who are able to profit by the instructions.
5. The working conditions must be such that the members of the group can benefit by the instruction, that is, the course must be specifically efficient.

You will generally find that foremen will soon become interested in the course if they get out of it something that they can easily apply on the job.

Training That Does Most Good

The management must discover the weakness or weaknesses in its organization and shape the course to strengthen this weak link. Every factory organization, large or small, presents certain complexities. In the small organization it is not so much a matter of detail work, such as record keeping and filing, but the proper management of men and the elimination of waste. Left on "his own hook," the small shop foreman is liable to jeopardize the owner's labor policy by "lording it" over the men unreasonably. In the larger factory the management places a check on the foreman, and he becomes merely a cog in a huge machine. Also, in the small plant there is a tendency to waste material. In the larger and more efficiently operated plant the management places many checks on waste. For one thing, there is a cost accounting system. The foreman must account for the various processes entering into the manu-

every man, for every machine, for every bit of material used in his department.

In the small plant it would therefore be useless to teach the foremen complicated record-keeping system that would serve no evident purpose. On the other hand, stress should be laid on the elimination of waste, the improvement of operating conditions so that more production could be obtained under the limited shop facilities, and getting more production from individual workmen by cutting down needless operations and reducing idleness. Of course, it wouldn't hurt to introduce the foreman to the more elaborate system material, such as proper record keeping, but so much of the material should be served out as the foreman could easily digest and apply on his every-day job. In other words, the instruction should serve to make his job easier for him.

Training to Meet Labor Problems

The labor element is none the less important in the larger and more efficiently run plant, but it takes on a slightly different aspect—at least as far as the foreman is concerned. Government investigators estimate that 70 per cent of the foreman's management problems in the large plant is concerned with labor management. The foreman's labor problem is more complex. Not only is the foreman concerned with more production-per-man, but he must help the operative adjust himself to the machine and to the process. This involves a knowledge of the machine, the process and the entire factory system, and without such knowledge the foreman cannot properly cooperate with the management to help the laboring man adjust himself. A great deal of the trouble in the modern factory grows out of the tendency of the foreman to follow instructions blindly, without regard to the human instincts of the workman and the relation of the individual executive to the firm's management policy.

An examination of the foreman training courses given in factory establishments shows that labor management forms a most important branch of the study. With that comes instruction in the laying out of work, filling out and filing of important records, the handling of material and equipment, safety work and sanitation.

The foreman is given an insight into the workings of the other factory departments, such as the cost department, the employment manager's office, and even into the operations of the sales department. The foreman learns how to cooperate with these departments, to help lower the direct labor cost on the production, to maintain a high quality product and to maintain delivery schedules of the raw and finished products.

The safety factor is important, as it has been shown that the foreman is largely responsible for failure of workmen to report slight injuries sustained during the workday.

Cooperation with Cost Department

The greatest weakness of the factory foreman is misunderstanding of the significance of cost accounting and his lack of cooperation with the cost department. During the course of the workday the foreman is required to fill out certain records. In a good many plants the foreman is rid of this detail by assigning the work to a clerk especially trained for the work. Nevertheless, the foreman is responsible for the proper filling out of the records. He must see that the records are sent to the proper offices without delay. He must see that they are correct in every way, that they are kept in prescribed form, that they are kept to date, that they are legible, and he must know offhand which of the records could be reported orally.

If the foreman is already familiar with the general process of manufacture his course of study should stress on plant machinery, equipment, materials and processes and the various statistical helps which he requires during his day's work. The modern foreman shows his efficiency by his manner of handling records in his department. He has his "Order of Work" sheet, on which he enters the number of each machine and the job assigned for each machine. This sheet he must send to the superintendent's office for approval before operations on the job can begin. He has other records, such as records of men employed in his department, men idle, machines idle and reasons for idleness, reports on delays in production and tardy arrival of tools and materials. The filling out of these records will prove an irksome task unless the foreman is informed of the significance of the cost department, unless he is informed through the medium of proper instruction how the cost department makes use of these records in figuring the cost of the finished product and how the sales department is helped to plan sales campaigns on the basis of cheaper production. He begins to realize that an idle machine means a loss of money. During the period of idleness the factory loses interest on the cost of the machine, on its depreciation, and on operatives being paid for doing nothing.

The Waste Costs

Waste of material in his department may not amount to much, but proper instruction will impress the foreman with the astounding fact that the sum total of waste in twenty or thirty departments may run into the hundreds of thousands of dollars a year.

By telling the foreman of the methods by which the storeroom, the employment department, the power house and other departments operate the foreman learns how to cooperate more efficiently with these departments in the future.

More recently another factor in factory organization has come into the foreman's sphere. This is the matter of job analysis. By analyzing

facture of an article and in turn analyzing each process, the factory management is enabled to eliminate unnecessary processes and thus reduce the cost of production. The foreman is expected to cooperate intelligently during the job analysis and to help the management reap the harvest from this simplification process.

The question presents itself whether the study of economics, finance and management and personnel problems in general should form part of the foreman's training course. That depends on the length of the course. In some plants the general courses precede the technical studies, such as were touched on above. In other plants the general courses are given after the foreman has completed a course of study of a strictly technical nature, on the theory that by that time he is more receptive to generalized study.

Uninsurable Losses in Raw Materials

(*Continued from page* 25)

The difference of 50 to 60 cents per barrel on whole sweetened condensed is evidence of the necessity for the judicious selection or specification of the grade or character of barrel to be used for the packing of this and such products as vanilla extract, etc. In the case of certain commodities like corn syrup, where you are offered a choice of steel drums in place of wood barrels, it is well to consider the freedom from soakage and leakage losses which the drum offers in determining the more desirable purchase.

The elimination of the soakage loss has given great impetus to the demand for second-hand barrels. It is evident that the barrel which has already reached the point of saturation in so far as soakage is concerned, is a decided economy over a brand new and consequently porous barrel in the packing of syrups or such extremely susceptible oils as cocoanut oil, peanut oil, etc. (i. e., up to the inevitable point where the further use of the barrel carries with it danger of rancidity).

One of the chief causes of abnormal soakage is brought out by a nationally-known manufacturer of invert sugar, who writes:

> **"The soakage naturally varies with the quality of the barrel or cooperage used, as, for instance, in the case of cooperage having 'sappy' staves. A 'sappy' stave cannot be dried and when put into a barrel the sap will tend to ferment, with the result that the stave will become porous. During the stress of war conditions we had considerable difficulty with the question of cooperage on account of its poor quality, and this applied to cooperage manufacturers who had a reputation for putting out a first-class package, the barrels containing staves which were porous, and if the goods were carried in them any length of time, the syrup or liquid would actually 'sweat' through the wood."**

It is not out of place to recall the references which have been made in this series to the custom of granting a soakage allowance in lines not connected with the candy industry as well as to the practice of certain vegetable oil refiners in billing their product "gross for net" in order to dodge their responsibility for the soakage loss. Also the means which have been taken to capitalize on the soakage principle in padding the tare by pouring heated corn syrup over date cases, etc.

Though there is no practicable means of completely avoiding these losses, we can nevertheless recognize them and allow for them in our costs, controlling their extent by the means described.

In the next article we will discuss the more preventable of the uninsurable losses, drainage, leakage and sifting, pilferage and sampling.

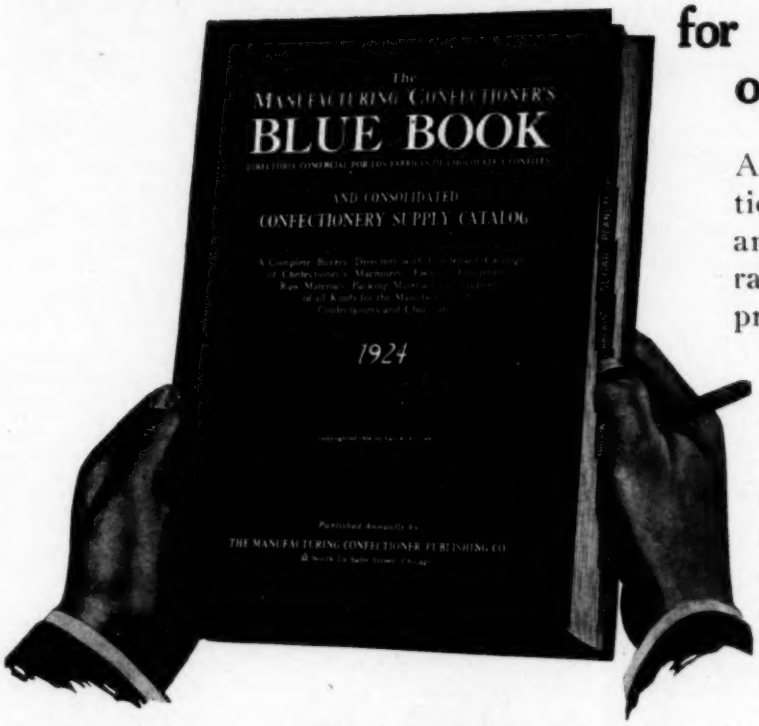
An Informal Talk About Men and Machines

(*Continued from page* 20)

inspected and adjusted or sharpened at regular stated intervals whether the need is apparent or not. When the need for repairs or adjustments becomes evident, it is a safe bet that the imperfections in the goods have been slowly growing more apparent and that therefore an outsider would have noticed them long before. With cutters it is probable that the variation in their working has caused variation in the weight of the goods. The company may have lost money or if not the packages are going out under weight and leaving the line open to criticism.

It all resolves itself down to the old story of constant watchfulness and intelligent handling. Have a nurse for your employes with a doctor on call, and by the same token have your operators taught to care for their machines with a practical machinist on call.

The Standard Buyer's Reference Book



for the manufacturers of confectionery

A complete buyer's information file and service indexed and cross indexed and arranged in handy form for practical desk use.

Every individual tool, utensil, machine and piece of equipment — every item of raw material and packing material and supplies and services for the manufacturer of confectionery will be listed together with their respective sources of supply.

The following confectionery supply firms have reserved catalog space.

In addition to the advertisers in this issue, as of January 10th, 1924, the following firms deserve your preferred consideration in your purchases for 1924:

Mathews Gravity Carrier Co.
Precision Thermometer & Instrument Co.
Emil Pick
Cary Maple Sugar Co.
National Equipment Co.
Powers Regulator Co.
Nulomoline Co.
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Candy and Chocolate Equipment Co.
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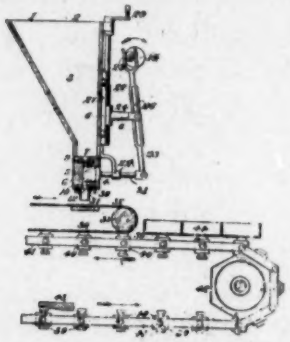
American Schaeffer & Budenberg Corp.
L. S. Nachman, Inc.
Kupfer Bros. Co.
Glidden Nut Butter Co.
Vacuum Candy Machinery Co.
Thomas Mills & Bro.

WHAT'S NEW?

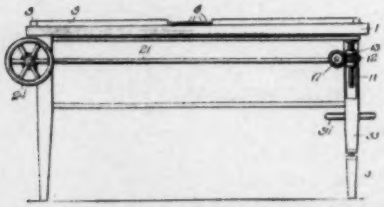
1,477,085. Depositor for Confection-Making Apparatus. Clifford P. Speck, Oakland, Calif. Filed June 27, 1921. Serial No. 480,767. 7 Claims. (Cl. 107—29.)



1. In a depositor for candy making apparatus having a movable mold and a holder for containing a supply of filler material, means for removing a charge of material from said holder, and devices including a movable open ended tube and an endless belt for receiving said charge from the removing means and transferring the same to the mold.

7. A depositor for candy making apparatus comprising a holder for containing a supply of filler material, a base member for said holder having a cylinder formed therein with inlet and discharge openings, valves for controlling said openings, a drive shaft, a crank on said shaft, a lever having its ends respectively connected with said crank and said piston, and a fulcrum for said lever positioned between its ends, said fulcrum being adjustable to vary the stroke of said piston.

1,478,490. Confection-Making Machine. Edward Sprague, Jr., Chicago, Ill., assignor to The Kuehl Candy Co., Davenport, Iowa, a Corporation of Iowa. Filed Dec. 14, 1922. Serial No. 606,815. 15 Claims. (Cl. 107—1.)

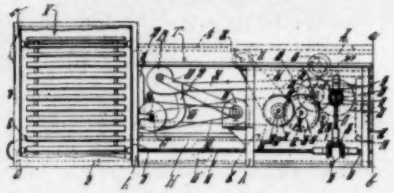


1. In combination, a slab upon which confection in liquid form is adapted to be poured, means for moulding the confection in cellular-like formation, said means adapted to be projected into the confection.

12. In combination, a slab upon which confection is adapted to be placed, a tiltable frame for said slab, feed screw means for tilting said frame, cell forming means on said frame for projecting above the surface of said slab, and means for controlling the movement of said cell forming means, said means comprising a carriage movable by a manually operable feed screw mechanism.

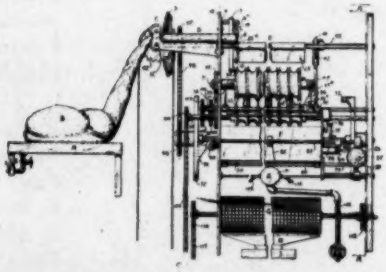
1,478,866. Candy-Making Apparatus. Alonzo Linton Bausman, Chicopee, Mass., assignor to National Equipment Company, Springfield, Mass., a Corporation of Massachusetts. Filed Dec. 2, 1920. Serial No. 427,781. 8 Claims. (Cl. 198—20.)

1. In apparatus of the class described, a frame, a packing table, a vertical conveyer into which trays are fed and carried downwardly below said table, a second vertical conveyer to carry trays upwardly to substantially the level of said table, intermediate vertical conveyers below the table and between the first and second conveyers to carry trays upwardly and downwardly and assist in their transition from the first to the second named vertical conveyers, horizontally operable transferring means to transfer trays from one conveyer to another and complete said transition of the trays, and driving mechanism to operate all said conveyers and said transferring means.



8. In apparatus of the class described, a frame, two endless conveyers mounted in spaced parallel relation, and means provided at spaced intervals on said conveyers to support the ends of trays disposed between the adjacent laps of said conveyers, one of said conveyers being mounted in said frame for movement bodily away from the other conveyer to permit access to the space therebetween.

1,479,569. Candy Machine. Frank Waida, Chicago, Ill., assignor to Mary A. Waida, Chicago, Ill. Filed Dec. 5, 1921. Serial No. 520,007. 15 Claims. Cl. 107—4.)

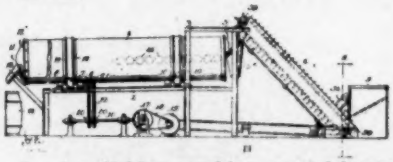


2. In a candy machine, the combination with cutter controlling means, means operated by said controlling means to cut the incoming candy into sticks, means also operated by the controlling means temporarily to support each stick, means receiving the sticks and cutting them into pieces of uniform size, or adjustable means for flattening the pieces, after cutting, to a desired thickness.

12. The combination with yielding means for cutting a constant stream of candy into sticks of uniform length, of means for subdividing said sticks into pieces of uniform length, adjustable means for flattening said pieces endwise to remove the burrs, and means connected with a prime mover and capable of actuating the aforenamed means in the proper time relation.

14. In a candy machine, means depositing sticks of candy from a batch outside the machine, three sets of cutting wheels intergeared for simultaneous rotation and arranged in triangular form, the lower set of wheels fixed to rotate in the machine frame, the two upper sets supported on swinging arms, a power driven eccentric connected to swing said upper wheels out and in to receive and cut said sticks into uniform pieces, and adjustable means pressing said pieces to a desired thickness.

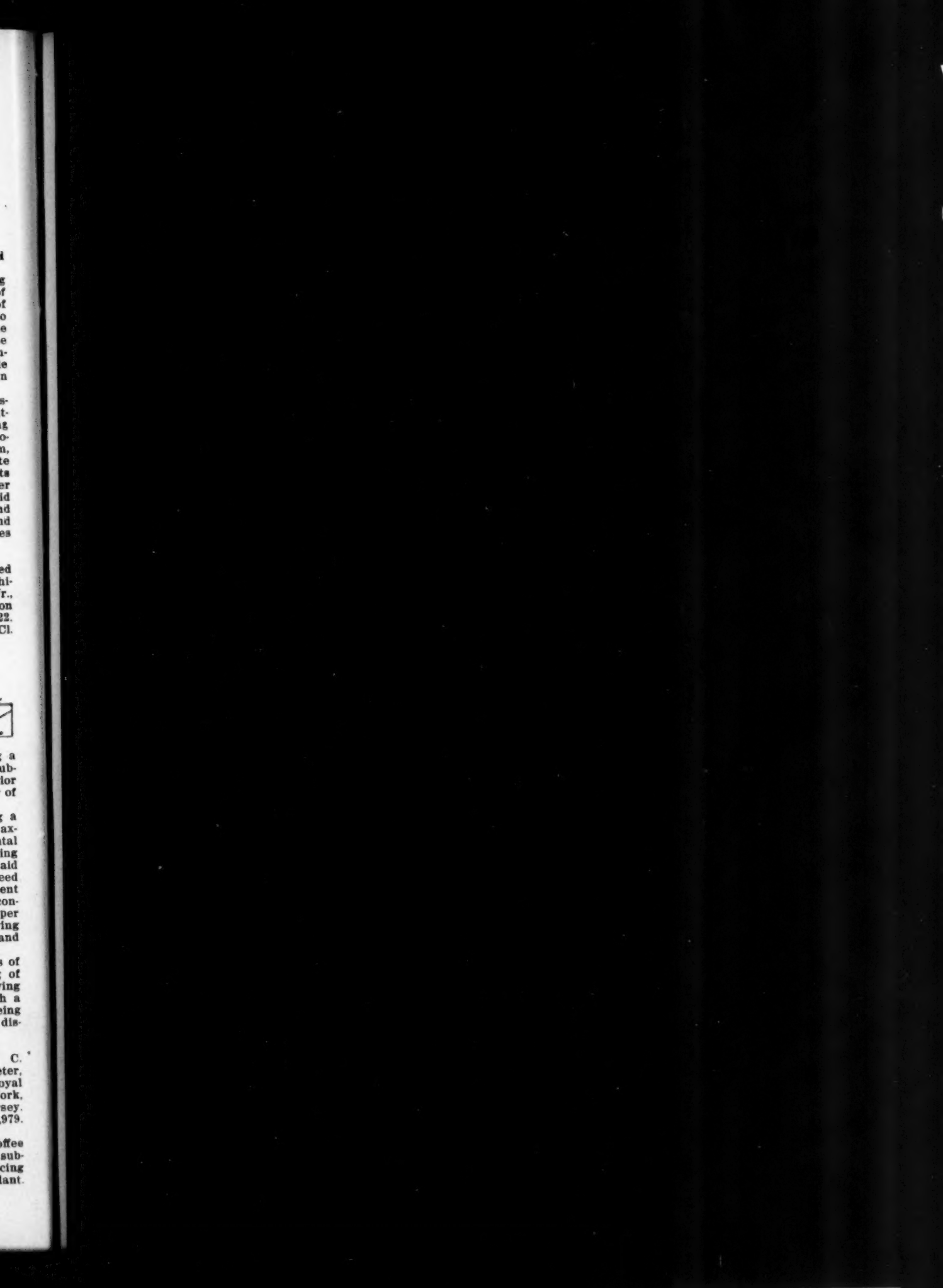
1,476,840. Polishing Machine for Coated Confections. Willet B. Kanney, Chicago, Ill., assignor to Wm. Wrigley, Jr., Company, Chicago, Ill., a Corporation of West Virginia. Filed June 5, 1922. Serial No. 565,977. 11 Claims. (Cl. 91—7.)



2. A polishing machine comprising a cylindric casing rotative axially in substantially horizontal position, the interior of said casing being lined with a layer of polishing substance.

8. A polishing machine comprising a cylindric casing adapted to revolve axially and in a substantially horizontal position and having a lining of polishing substance, a supporting frame for said casing, and intermediate rollers, a feed hopper comprising an agitator adjacent the delivery opening therefrom, a conveyor extending from said feed hopper to one end of said casing, and driving mechanism for said casing, agitator and conveyor.

11. A method for polishing articles of the character described, consisting of feeding said articles into a revolving casing having its surface coated with a polishing substance, said articles being advanced through said casing and discharged from the opposite end.

1,476,612. Confection. Frederick C. Hitch, Brooklyn, and Arnold H. Peter, New York, N. Y., assignors to Royal Baking Powder Company, New York, N. Y., a Corporation of New Jersey. Filed Apr. 3, 1920. Serial No. 370,979. 3 Claims. (Cl. 99—11.)

3. A confection comprising coffee ground to an impalpable powder, a substance carrying oil expressed in reducing the coffee to the powder, and a fondant.